REMARKS/ARGUMENTS:

The final office action dated September 14, 2009 concluded as follows for the subject application:

- Claims 1-31 were rejected under 35 USC 112, 1st ¶ for reciting subject matter that is not supported in the original disclosure;
- Claims 1-2, 4, 6-8, 13-15, 17, 19-21 and 26 were rejected under 35 USC 103(a) as obvious over the combination of Ling (US Pat Publ. 2003/0043928) with DuPree (US 5,175,558);
- Claims 3, 5, 16 and 18 were rejected under 35 USC 103(a) as obvious over the above Ling/DuPree combination in further view of Koetter (US 6,634,007);
- Claims 9-12 and 22-25 were rejected under 35 USC 103(a) as obvious over the above Ling/DuPree combination in further view of Slack (US 4,5774,252); and
- Claims 27-31 were rejected under 35 USC 103(a) as obvious over the above Ling/DuPree combination in further view of Rogard (US 4,718,066).

INTERVIEW SUMMARY: The undersigned representative and Examiner Timory engaged in a telephone interview on September 10, 2009, as the Examiner's PTOL-413B recites (note this is prior to the date of the final Office Action). The Examiner indicated his intention to finally reject the claims under 35 USC 112, 1st ¶, to which the undersigned cited to the originally filed application at page 2 lines 19-22; page 8 lines 6-8; page 11 lines 19-20; and page 12 lines 5-7. The Examiner was not persuaded that any of those citations enabled a symbol-by-symbol determination as the independent claims recite. The Applicant disagrees that the claim language cited in bold at pages 2-4 of the final Office Action are not supported in the original disclosure. The Applicants submit this RCE as opposed to appealing the rejections set forth in the final Office Action since an RCE is likely the faster and less expensive option toward a patent grant.

35 USC 112, 1ST ¶: Claims 1, 14, 27, 30 and 31 are each amended to remove the clause which the final office action asserts is not fully supported by the original disclosure. This renders moot the rejections to all claims under 35 USC 112, 1st ¶.

35 USC 103(A) OVER LING AND DUPREE: Of the claims rejected as obvious over the Ling/DuPree combination, only claims 1 and 14 are independent.

Embodiments of the invention of the subject application relate to solving a problem of periodic block fading in a received signal, such as might occur due to a rotating helicopter blade obstructing the wireless channel (abstract, page 1 lines 19-22). Where the fade is particularly deep, such as with the rotating helicopter blades or with signal jamming, forward error correction and interleaving are insufficient (page 1 lines 22-26). Note that forward error coding FEC and interleaving are imposed on the *transmitted signal*, but the deep block fade *due to obstruction or jamming* is present in the signal that is received *regardless of any FEC at the transmitter.* It is the receiver which estimates or detects this block interference (page 2 lines 11-13), and at those times where block fading occurs in the received signal, the receiver inserts zero symbols into the received signal stream, prior to the receiver's FEC decoder, to effectively 'erase' the severely degraded symbols (page 2 lines 19-22).

Claim 1 is not specific to the rotating helicopter blade being the cause of a deep fade in the received signal, and as amended herein recites (emphasis added):

> A method to operate a digital signal receiver, comprising:
> detecting occurrence of a symbol degrading event for a received signal, wherein the symbol degrading event occurs after transmission and before reception of the received signal;
> **inserting zero symbols into a received symbol stream to replace symbols degraded by the signal degrading event** prior to de-interleaving the received signal; and
> error correction decoding the received symbol stream having the inserted zero symbols.

Claim 1 is directed explicitly to the receiver side of a communication.

Ling is directed to forward error coding at the transmitter (abstract) and similar reverse processing at the receiver. At the receiver the particular flavor (e.g., CRC, convolutional, turbo, block) of the FEC used in the encoding process at the transmitter is used to reconstruct the received signal at the receiver [0068].

The office action cites to Ling at [0025] and [0029] as rendering obvious the second recited element (inserting zero symbols...) of claim 1. Ling at ¶0025 describes interleaving and puncturing bits in the transmitter prior to transmission. Ling at ¶0029 describes the reverse process in the receiver, in which the bit positions which were punctured at the transmitter are filled with zero values at the receiver prior to de-interleaving. This is necessary so that the

de-interleaving process at the receiver results in the same order of bits in the bit stream in the receiver which entered the interleaving process at the transmitter; absent the receiver's insertion of the zero values at the positions in which the transmitter punctured the bits, the de-interleaving at the receiver will not match the interleaving at the transmitter. Therefore, the rejection of claim 1 fails on two separate and independent grounds.

First, Ling's zero values are inserted at pre-destined positions irrelevant of any fading which occurs in the channel (or as claim 1 recites "after transmission and before reception of the received signal"). This is essential in order for the Ling receiver to properly decode the signal it received. Ling states explicitly at that "The interleaved bits are then punctured (i.e., deleted) to provide the required number of coded bits." As is well known in the wireless communication arts and as alluded there by Ling, puncturing enables the transmitter to rate-set its transmissions, which Ling states at ¶0027 is dependent on the channel conditions ("The number of information bits that may be transmitted for each modulation symbol for a particular level of performance is dependent on the SNR of the transmission channel.").

Both the specific positions from which bits are punctured and how many are punctured by the transmitter must be known by the receiver in order that the receiver can replace the correct punctured bit positions with zero values, those positions cannot be due to a "symbol degrading event (that) occurs after transmission and before reception of the received signal" as claim 1 recites. This is because at the time the transmitter punctures bits it is unaware at which bits will be corrupted in the channel. More particularly from the receiver's perspective as claim 1 recites, the Ling receiver cannot insert "**zero symbols into a received symbol stream to replace symbols degraded by the signal degrading event**", but instead inserts its zero values into the positions at which it knows the transmitter punctured. The receiver can know this by simply measuring the rate of the received signal, or the channel SNR, or several other techniques known in the art. If Ling's receiver inserted zero values at other than the positions which the Ling transmitter punctured, it would be unable to properly decode the received signal because its de-interleaving would not line up with the interleaving done at the transmitter. Therefore to modify Ling's receiver so that it puts zero values at positions that correspond with fades caused by the channel rather than known transmitter puncture positions renders Ling's receiver inoperable

In a related vein, Ling's punctured bits are never transmitted. At Ling ¶0025 it is explicit that the punctured bits are deleted. Being deleted at the transmitter prior to transmission of the overall signal, they cannot be transmitted, and so no Ling receiver can insert the zero values to "replace" symbols or bits that are degraded. Being degraded does not encompass being non-existent. To the Ling receiver, the punctured bits are non-existent in the signal it receives, which is exactly why it must replace them with dummy values; so the de-interleaving lines up properly.

Second, Ling replaces only bits rather than symbols as claim 1 recites. The explicit text at cited ¶0025 of Ling discloses bit puncturing at the transmitter, and at cited ¶0029 of Ling discloses that erasures/zero value indicatives are inserted for coded bits that were punctured. Ling's rate setting via puncturing does not drop entire symbols; at ¶0027 Ling is explicit that the number of information bits *per symbol* is varied to get the rate/level of performance, and at ¶¶0025, 0027 and Figure 1 discloses that symbol mapping (symbol mapping block 118) occurs on the un-punctured bits *after* other bits are punctured out and removed (by puncturer block 117). To modify Ling so that entire symbols are punctured would greatly degrade its data throughput since many more re-transmissions would necessarily be required where entire symbols are missing in the received symbol stream as opposed to individual bits. For example, CRC can aid in recovery from a bit that is received or decoded in error but not for an entire missing symbol. So modifying Ling's puncturing to be of symbols rather than of bits would result in lesser data throughput and greater re-transmissions as compared to Ling's unmodified FEC teachings.

DuPree cannot cure either of the above shortfall of Ling, for reasons stated above: to adapt or modify Ling in a manner to read on the second element of claim 1 is to render Ling's receiver inoperable and/or prone to more severe signal degradation and more frequent re-transmissions (e.g., all the symbols that were punctured). DuPree is cited only for the proposition of detecting occurrence of a symbol degrading event. Because Ling cannot correct for that by inserting zero values prior to de-interleaving, claim 1 is non-obvious over the combination of Ling with DuPree.

Claim 14 recites for a receiver similar in relevant respects as the elements of method claim 1 detailed above as distinguishing over the Ling/DuPree combination, and so independent claim 14 is patentable over the cited art.

Neither Koetter, Slack or Rogard, alone or in any combination, is seen to cure the above shortfalls of the Ling/DuPree combination vis a vis claims 1 or 14. Claims 2-13 and 15-26 each depend from either claims 1 or 14, and so are patentable at least for that dependency and not separately argued herein.

35 USC 103(A) OVER LING, DUPREE AND ROGARD:

Claim 27 as amended herein recites:

> A method to receive a signal that passes through a channel that is periodically obstructed by a rotating propeller blade, comprising:
> detecting occurrence of a fading condition due to obstruction by the propeller blade;
> in response to detecting the occurrence of the fading condition, inserting zero symbols into a received symbol stream at the receiver to replace symbols degraded by the fading condition caused by the obstructing propeller blade;
> de-interleaving the received symbol stream having the inserted zero symbols; and
> decoding the received symbol stream having the inserted zero symbols.

The final office action asserts the same substantive combination of Ling/Dupree against claims 27, 30 and 31 as detailed above respecting claim 1. The rejection of these claims further relies on Rogard for the proposition that the periodic fade shown at Rogard's Figure 3 and which Rogard discloses at col. 1 lines 30-32 as being due to regularly spaced trees along a road on which a receiver vehicle is traveling renders obvious the claimed fading condition due to obstruction by a propeller blade.

Assuming without admitting that Rogard's regularly spaced trees are properly analogized for fading purposes to a rotating propeller blade as claim 27 recites, it remains that claim 27 distinguishes over the asserted Ling/DuPree combination for reasons similar to those detailed above with respect to claim 1, and Rogard has no teaching to cure the shortfalls of Ling as set forth above vis a vis claim 1. Therefore claim 27 is non-obvious over the Ling/DuPree/Rogard combination. Claims 28-29 depend from claim 27, and so are patentable at least for that dependency and not separately argued herein.

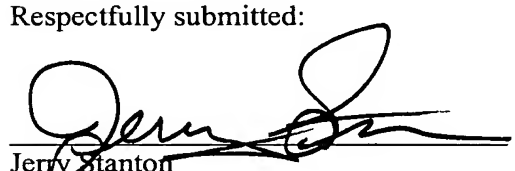
Claims 30 and 31 recite similar in relevant respects as the elements of method claim 27 argued immediately above (except claim 31 does not recite particularly that the obstruction is

by the propeller blade), and so each of these independent claims distinguish over the Ling/DuPree combination as detailed above for claim 1, regardless of whether Rogard is included with Ling and DuPree.

Neither Koetter nor Slack, alone or in any combination, is seen to cure the above shortfalls of the Ling/DuPree/Rogard combination vis a vis claims 27, 30 or 31.

All claims are now seen to be in condition for allowance. The Examiner is requested to withdraw the rejections and pass claims 1-31 to issue. The undersigned representative welcomes the opportunity to resolve any matters that may remain, formal or otherwise, via teleconference at the Examiner's discretion.

Respectfully submitted:



Dec 14, 2009

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